

CT and hemifacial spasm

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Article abstract—Forty-six patients with typical hemifacial spasm had CT. Thirty-eight (83%) were abnormal, including two with surgically documented tumors. Thirty-six had a characteristic dolichoectatic vertebrobasilar artery, with the convexity pointing to the side of the spasm in 92% of the scans. This study suggests that CT is a worthwhile procedure in the evaluation of hemifacial spasm and that dolichoectatic vertebrobasilar arteries are very frequently associated with hemifacial spasm.

NEUROLOGY 1988;38:1111-1113

Hemifacial spasm (HFS) is a movement disorder of the face characterized by frequent, involuntary twitches of muscles innervated by the seventh cranial nerve. Although the disorder has been characterized as idiopathic, many neurosurgeons have reported vascular loops compressing the seventh nerve at the nerve root exit zone.¹⁻⁴ Infrequently, tumors have been associated with HFS as well. There have been reports of abnormal CTs with HFS,⁵⁻⁸ but there has never been a prospective study with CT for this condition.

Materials and methods. Patients had CT who presented to the neurology and ophthalmology departments from 1980 to June 1987 with a diagnosis of typical HFS. Initially, three patients had unenhanced scans, but since vessels are better identified using contrast enhancement, contrast was used in all later scans. Scans were reviewed prospectively for abnormalities.

We later reviewed all of the scans again, without clinical information. We tried to predict the side of the spasm by looking at the posterior fossa for abnormalities of vessels, tumors, and other malformations.

Results. Between 1980 and 1987, we identified 46 people with HFS. There were 27 women and 19 men. Ages ranged from 22 to 85, with a mean of 64.2 years. There were 19 with right, 26 with left, and one with bilateral HFS.

Thirty-eight scans (83%) were abnormal, including two with surgically documented tumors—an epidermoid and a meningioma. Thirty-six scans showed a characteristic dolichoectatic basilar artery. We defined dolichoectatic basilar artery in accordance with the definition proposed by Smoker et al.^{9,10} There were only eight normal scans. Two of the three noncontrast-enhanced CTs were among these.

Of the other 36 abnormal scans, which we read in a

masked fashion, we identified the side of the HFS by the direction of the convexity of the dolichoectatic basilar artery in 33 of 36 (92%) scans.

Discussion. HFS was described as an idiopathic disorder in the past¹¹; however, many of these early studies did not have the benefit of radiologic techniques, and a cause was never found.

A neurosurgical nerve wrapping procedure is used for this condition, and surgeons have reported frequently that vessels (vertebral, basilar, and, more frequently, anterior inferior cerebellar artery [AICA] and posterior inferior cerebellar artery [PICA] or their small branches) were sitting on the seventh nerve root exit zone.^{1,3} Gardner and Sava¹² first reported cases with the vertebrobasilar system compressing the seventh facial nerve in 1962. Since then there have been many reports of similar findings.^{2,7,12-15} Sunderland¹⁶ reported incidental dolichoectatic arteries of the basilar system in 22% of autopsied brains he reviewed; no clinical correlation was ever made. Sacks and Lindenburg¹⁷ popularized the term "dolichoectatic" vertebral and basilar arteries.

Recently, Smoker et al⁹ reviewed dolichoectatic basilar arteries on CTs and published criteria for defining the diameter, height of the bifurcation, and transverse position of the normal basilar artery from a review of 126 normal CTs in patients ranging from 4 to 85 years old. They found the basilar artery is midline throughout its course in 55% of cases, but still medial to the lateral margin of the clivus or dorsum sellae in 43% of cases. In only 2% of normal cases was the vertebrobasilar artery visualized lateral to the clivus or dorsum sellae, and in no normal case was it as far lateral as the cerebellopontine angle (CPA) cistern. In the second part of their study, symptom-

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Dr. Digre was supported by a Heed Ophthalmic Foundation Fellowship (1986-1987). This work was also supported by an unrestricted grant from Research to Prevent Blindness, University of Iowa.

Received August 20, 1987. Accepted for publication in final form December 2, 1987.

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atic patients were evaluated.¹⁰ Isolated cranial nerve deficits were more likely to be present with normal-sized but malpositioned, tortuous vessels. Patients with dilatation (ectasia) of the basilar artery more commonly have multiple compressive cranial nerve and ischemic neurologic deficits (locked-in and Wallenberg syndromes, hemiplegia, dysarthria, dysphonia, hyperreflexia, ataxia, etc).¹⁰ Six patients in their study had isolated HFS. In all cases, the distal vertebral or proximal basilar artery was visualized in the CPA cistern of the affected side.¹⁰

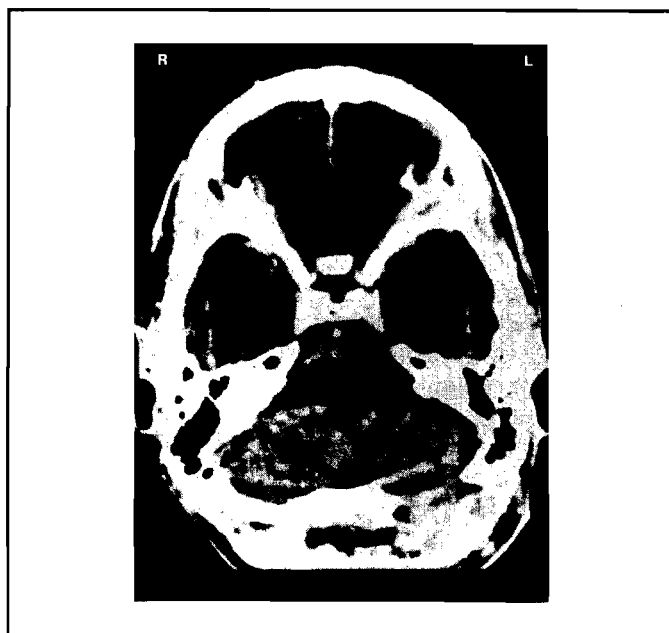


Figure 1. One tumor causing hemifacial spasm: a man with an epidermoid tumor in the left cerebellopontine angle causing left hemifacial spasm.

Carlos et al⁵ more recently demonstrated tortuous and dilated arteries by arteriography in 51 patients with HFS. They commented that there was a dolichoectatic basilar artery in the CPA in three CTs; however, how many other patients had any dolichoectasia of the vertebrobasilar system was unclear. Their angiographic findings of frequent anomalous branching of AICA and PICA, as well as frequent elongation of the vertebral system, support our findings.

We propose that HFS is commonly associated with a tortuous and elongated vertebrobasilar system. The exact way in which this causes the spasm is unknown, but we would postulate that there are two possible mechanisms. First, direct compression by the vertebral or basilar artery might be possible. Vessels distorting the nerve root exit zone could trigger such a spasm. Obviously, all CTs do not show the basilar artery at the CPA, and this probably is not the only mechanism. Second, branch vessels, especially the AICA and PICA, frequently abut the nerve in this location. The convexity of the vertebrobasilar system usually points to the side of the HFS. It may be that the tortuous and elongated artery pushes other tributary branches into the nerve root exit zone. Other studies support this possibility.^{5,7}

We think contrast-enhanced CT is an important diagnostic procedure in evaluation of a patient for HFS, since we discovered two unsuspected tumors whose sole presenting feature was HFS. Second, in recommending treatment, especially surgical, knowledge of the possible aberrant vessel is necessary.

HFS was at one time considered an idiopathic disorder. With the advent of CT and other new imaging techniques, it is possible to detect a probable cause for the spasm in 83% of the cases. With high field-strength magnetic resonance, the seventh cranial

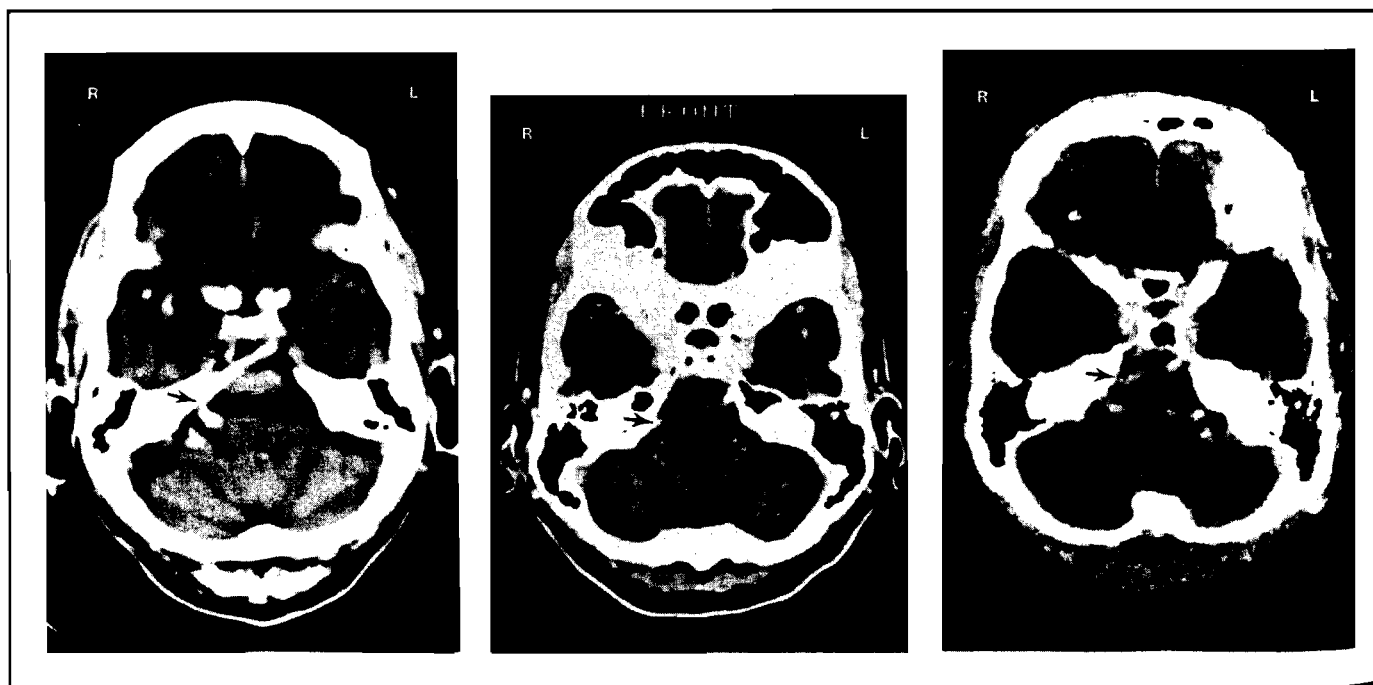


Figure 2. Representative CTs of patients with right hemifacial spasm. The arrows point to the convexity of the dolichoectatic basilar artery.

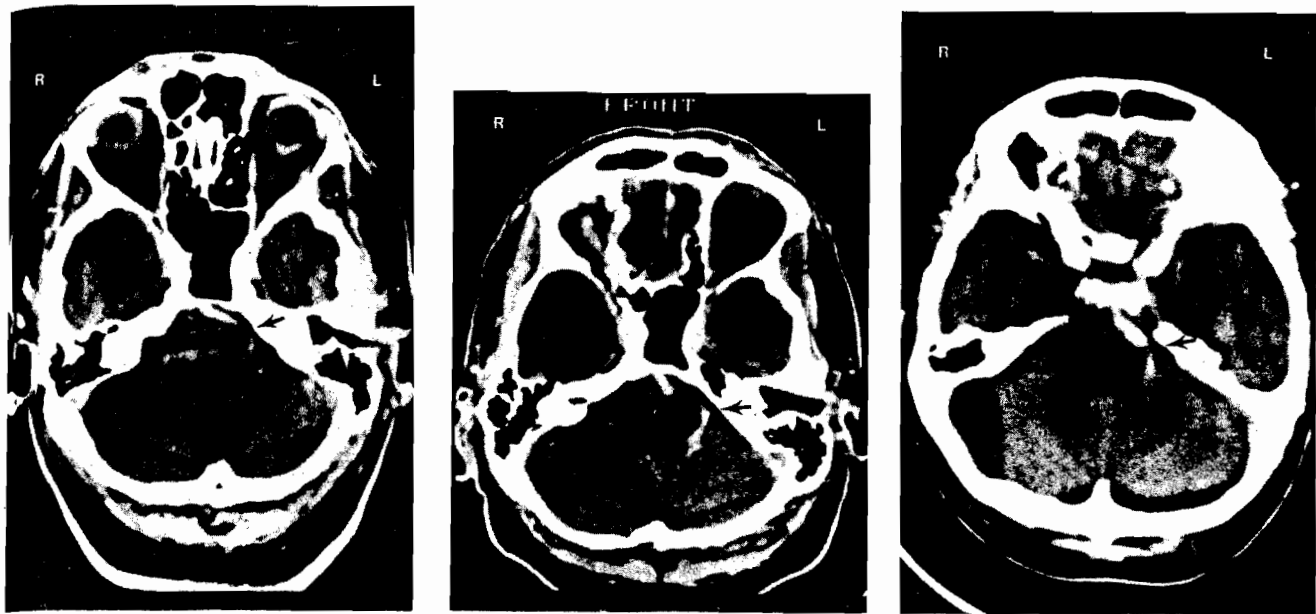


Figure 3. Representative CTs of patients with left hemifacial spasm. The arrows point to the convexity of the dolichoectatic basilar artery.

nerve is usually visualized, and the relationship surrounding the vascular structures may be even better assessed.

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